

REMARKS

Further to the Office Action mailed October 27, 2009, Applicant amends the claims and respectfully requests reconsideration.

Interview Summary

The Applicant thanks the Examiner for the courtesies extended to Applicant's attorney in the interview conducted on October 15, 2009. Although no agreement as to the claims was reached, Applicant appreciates the Examiner's comments and analysis.

The Applicant submitted claims amendments for discussion purposes only during the interview. The Examiner and Applicant's attorney went over what was proposed and the Examiner provided various points for the Applicant to consider.

The claims amendments submitted herein are the result of the Applicant considering the Examiner's comments and are being submitted in furtherance of the prosecution of this application.

In the Claims

Applicant has amended claims herein to expedite prosecution of this application. In doing so, Applicant does not dedicate the subject matter of the amended claims, as originally filed, to the public, and does not acquiesce to the Examiner's reason(s) offered in support of any rejections of the amended claims, or any claim(s) that depend therefrom. Applicant also reserves the right to seek patent protection for claims similar or identical to the amended claims, as originally filed, in one or more subsequently filed and related applications.

By this amendment, Applicant has canceled claims 10 and 16-18; and amended claims 1, 14 and 19. Applicant respectfully submits that no new matter has been added as support for these amendments to the claims is found at least at page 9, line 22 - page 11, line 24; and Fig. 2, of the originally filed specification.

Rejections Under 35 U.S.C. §102

Claim 19 stands rejected under 35 U.S.C. §102(b) as being anticipated by Garvey, US Publication 20040021381. Applicant respectfully traverses the rejection.

Garvey, as discussed in Applicant's previous response, is directed to a magnetic bearing in which bearing forces can be developed as a result of magnetic shear stresses acting across three or more substantial interleaf gaps. (Paragraph 34). In some preferred embodiments of Garvey, electrically conductive material is arranged to allow the flow of electric currents in order to influence the path of magnetic flux across at least one interleaf gap. (Paragraph 42). Further, permanent magnet material may be distributed within the interleaved bearing elements in order to influence the path of magnetic flux across at least one interleaved gap. (Paragraph 42).

Referring to an active radial-magnetic bearing, Garvey teaches that a set of alternating regions 37 of low relative permeability and regions 38 of high relatively permeability are provided. (Paragraph 141; Fig. 29). An internal MMF (magneto-motive force) source 36 and an external MMF source 35 produce a 2-pole MMF. (Paragraph 142). As shown in Garvey, Fig. 29, the paths 39 taken by magnetic flux through the bearing exhibit a zig-zag pattern and thus a "substantial air gap sheer-stress across each individual air gap acting [in the present instance] to pull the bearing rotor down and to pull the bearing stator up," is evident. (Paragraph 143, Fig. 29).

Claim 19, as amended, is directed to an active magnetic radial bearing having a stator and a rotor. Claim 19 recites, among other components, that the stator includes an excitation coil and a first stator portion comprising first ferromagnetic material comprising a "plurality of ferromagnetic laminations stacked in a direction parallel" to an axial length of the rotor. The stator also includes a second stator portion comprising a second ferromagnetic material where the excitation coil surrounds the first and second stator portions and the second stator portion is located between the first stator portion and the excitation coil.

In order for a reference to anticipate a claim, each and every limitation of the claim must be found in the reference. Applicant respectfully submits that Garvey does not anticipate claim 19 for at least the reason that there is no disclosure of a stator

having a portion made from a “plurality of ferromagnetic laminations stacked in a direction parallel” to an axial length of the rotor as recited in claim 19, as amended. Applicant can find no discussion of laminations in Garvey as recited and arranged in claim 19.

Applicant respectfully submits, for at least the reasons discussed above, that claim 19 is not anticipated by the Garvey reference.

Rejections under 35 USC § 103

Claims 1-6, 11 and 12 stand rejected under 35 USC §103 as being unpatentable over U.S. Patent 5,844,339 to Schroeder in view of Garvey. Applicant respectfully traverses as set forth below.

Independent claim 1, as amended, is directed to an active magnetic bearing that comprises a stator comprising at least first and second opposing electromagnets. The stator is disposed about a ferromagnetic body forming a rotor held without contact between the electromagnets. Each of the first and second electromagnets comprises a magnetic circuit essentially constituted by an excitation coil and a “first portion comprising a first ferromagnetic material.” Further, each electromagnet includes a second portion “comprising a second ferromagnetic material having magnetic permeability that is lower than that of the first ferromagnetic material and electrical resistivity that is higher than that of the first ferromagnetic material.” In each of the first and second electromagnets, the “second portion is located between the first portion and the excitation coil” and the “first ferromagnetic material comprises a plurality of ferromagnetic laminations stacked in a direction parallel to an axial length of the rotor.”

In general, the two portions “channel” the high frequency magnetic field lines for auto-detection of the positioning of the bearing. The first portion passes the low-frequency magnetic fields generally used to control position while the second portion passes the higher frequency used to detect position.

The Examiner asserts that Schroeder teaches all of the limitations of claim 1 except for the different magnetic permeabilities and electrical resistivities of the first and second ferromagnetic materials. The Examiner, however, cites Garvey as disclosing materials of

different magnetic permeabilities and resistivities to guide magnetic flux pattern in the bearing unit.

Garvey has been discussed previously but does not remedy the deficiencies of Schroeder with respect to claim 1 and Applicant respectfully submits that the combination does not render obvious that which is recited in Applicant's claims.

Applicant respectfully submits that independent claim 1, as amended, is patentable over the cited combination of Schroeder and Garvey for at least the reason that there is no teaching or suggestion that the second portion, i.e., the portion having the magnetic permeability that is lower than that of the first ferromagnetic material and electrical resistivity that is higher than that of the first ferromagnetic material, is located between the first portion and the excitation coil and where the "first ferromagnetic material comprises a plurality of ferromagnetic laminations stacked in a direction parallel to an axial length of the rotor," all as recited in claim 1, as amended.

Accordingly, Applicant submits that independent claim 1, and dependent claims 2-6, 11 12, for at least the reason that they depend either directly or indirectly from claim 1, are allowable over the cited combination of Schroeder in view of Garvey.

Claim 7 stands rejected under §103 as being unpatentable over Schroeder and Garvey as applied to claim 4, from which it depends, and further in view of Meeks.

Applicant respectfully submits that claim 7 is allowable for at least the reason that Meeks does not remedy the deficiencies of Schroeder and Garvey with respect to independent claim 1 from which claim 7 indirectly depends.

Claims 8 and 13 stand rejected under §103 as being unpatentable over Schroeder and Garvey as applied to claims 1 and 4 and further in view of Clark.

Applicant respectfully submits that claims 8 and 13 are allowable for at least the same reasons as submitted above with regard to independent claim 1, from which these claims depend, as Clark does not remedy the deficiencies of Schroeder and Garvey with respect to claim 1.

Claim 9 stands rejected under §103 as being unpatentable over Schroeder and Garvey as applied to claim 1 and further in view of SKF "Hybrid Bearings for Electrical Machinery."

Applicant respectfully submits that claim 9 is allowable for at least the same reasons as submitted above with regard to independent claim 1, from which claim 9 depends, as the SKF reference does not remedy the deficiencies of Schroeder and Garvey with respect to claim 1.

Claims 14 and 15 stand rejected under §103 as being unpatentable over Schroeder, Garvey, and Meeks as applied to claim 7 and further in view of SKF and Clark.

For at least the same reasons as submitted above with regard to independent claim 1, Applicant respectfully submits that dependent claim 14 is allowable as SKF and Clark do not remedy the deficiencies of Schroeder, Garvey or Meeks.

Claim 20 stands rejected under §103 as being unpatentable over Garvey in view of Foshage, U.S. Patent 6,770,995.

Applicant respectfully submits that claim 20 is allowable over the cited combination of references as Foshage does not remedy the deficiencies of Garvey with respect to independent claim 19, from which claim 20 depends.

Foshage is directed to a rotor disk having a first plurality of concentric teeth and a stator with a second plurality of concentric teeth. (Col. 3, lines 40-45). The first and second pluralities of teeth are spaced apart from each other to allow a magnetic flux to flow therebetween. (Col. 3, lines 45-50).

The Examiner points to Foshage, Fig. 3, as disclosing first and second stacks of ferromagnetic material of first and second thicknesses, respectively. Applicant, however, can see no such teaching in this figure. Applicant notes that Figure 3 is an expanded view of a portion of Figure 2 and shows the arrangement of the flux focusing magnets 20 and the stator disk 14 and the rotor disk 16. (Col. 6, lines 29-42). There is no discussion, however, of laminations in these portions.

Applicant submits, therefore, that as there is no teaching in Foshage of laminations, there is no teaching to modify Garvey to include laminations of differing thicknesses. Thus, for at least this reason, Applicant submits that claim 20 is not rendered obvious by the cited combination of references.

In view of the foregoing, Applicant believes the pending claims are in condition for allowance and a notice to this effect is earnestly solicited. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application. The Examiner is hereby authorized to charge any fees due to this submission, or credit any balance, to Deposit Account No. 23-0804.

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Respectfully submitted,

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